Metrologic®

ScanPal®2

Portable Data Terminal

User manual

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ScanPal 2

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1. Introduction

The ScanPal 2 is a high performance, light-weight and compact portable terminal, designed for daily intensive use.

It is powered by two ‘AAA’ replaceable batteries or one Ni-MH rechargeable battery and is equipped with a comprehensive set of development tools, including a Windows based application generator, a "BASIC" compiler and a "C" compiler.

It is provided with an FSTN technology LCD graphics screen, with a resolution of 128x64 pixels, equipped with backlighting and a contrast control enabling it to be read perfectly, whatever the ambient lighting.

Its CCD scanner and integrated RS-232 and IrDA communication ports make the ScanPal 2 ideal for inventory, stock control, document monitoring, factory floor management, asset tracking, warehousing and distribution operations.

2. General characteristics

The basic characteristics of the ScanPal 2 are as follows:

2.1. Electrical characteristics

- *Main battery* ..... two AAA replaceable batteries or one Ni-MH rechargeable battery
- *Backup battery* ..... 3.0 V, 7.0 mAh rechargeable lithium battery, for the static random access memory (SRAM) and the calendar
- *Stand-alone operation* ..... over 100 hours and over 50,000 reads (CPU in low-speed mode and 1 read every 5 seconds)

2.2. Environment

- *Humidity (operating)* ..... non-condensing from 10% to 90%
- *Humidity (storage)* ..... non-condensing from 5% to 95%
- *Temperature (operating)* ..... from -20° C to 60° C (-4° F to 140° F)
- *Temperature (storage)* ..... from -30° C to 70° C (-22° F to 158° F)
- *EMC regulations* ..... FCC class A, CE and C-Tick approved
  (EMC: Electromagnetic compatibility) *(FCC: Federal Communications Commission)*
- *Shock resistance* ..... 1.2 m (4') drop on to concrete

2.3. Physical characteristics

- *Dimensions* ..... 145 mm (5.7") L x 63 mm (2.5") W x 33.5 mm (1.3") H
- *Weight* ..... 180 g (6.3 oz) including batteries
- *Color* ..... dark grey
- *Material* ..... ABS (Acrylonitrile Butadiene Styrene)

2.4. CPU

- Toshiba 16-bit CMOS microprocessor
- Dual clock with low-speed mode capability for saving the batteries (for further information on the *Speed* setting, refer to section 5.3)

2.5. Memory

- *Program* ..... 1 MB Flash ROM, flash memory used for saving the program, character sets, constants, etc.
- *Data* ..... 1 MB SRAM, static random access memory

2.6. Scanner

The ScanPal 2 is equipped with a CCD scanner. The scanners characteristics are as follows:

ScanPal 2C (CCD)

- *Minimum bar width* ..... 0.102 mm (4 mil)
- *Depth of field* ..... 30 mm – 160 mm (1.2" – 6.3 ") for 0.33 mm (13 mil) codes
- *Field width*..... 124 mm (4.9") @ 160 mm (6.3")
- *Scan rate* ..... 100 scans / second
- *Ambient light rejection* ..... 1200 Lux (direct lighting from the sun)
  2500 Lux (fluorescent lighting)

2.7. Screen

- FSTN technology LCD graphics screen, with a resolution of 128x64 pixels and LED backlighting.

2.8. Keypad

- 21 rubber keys, consisting of alphanumeric keys, arrow keys, function keys and a key for triggering the scanner.

2.9. Indicator

- *Buzzer*..... audible indicator, programmable from 1 KHz to 4 KHz, low-power transducer type
- *LED*..... dual-colour (green and red) programmable LED

2.10. Communication

Three types of communication are possible: standard RS232, infrared and screen/keyboard.

- *RS232*..... transmission speed up to 115,200 bps
- *Infrared* ..... standard 1.0 IrDA or high-speed IR:
  - transmission speed up to 115,200 bps
  - distance, 5 cm to 100 cm (2” to 39”)
  - maximum angle, 30 °
- *Keyboard* ..... only for data upload

2.11. Programming language

- *Application generator (under Windows)*
- *"BASIC"*
- *"C"*

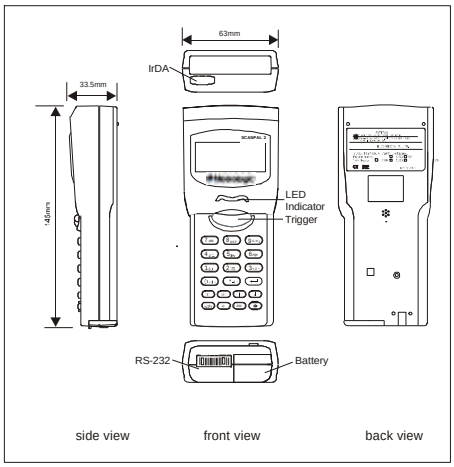
2.12. Accessories

- *Battery charger*
- *Ni-MH rechargeable battery*
- *Keyboard wedge cable*
- *Protective case*
- *High-speed IR transceiver*
- *Download/charger cradle*
- *RS232 cable*
- *Cradle power supply (only for the charger function)*

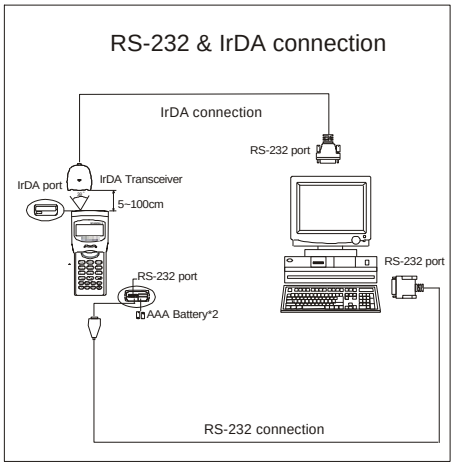
For the references and descriptions, refer to section 7.

3. Hardware configuration

3.1. Front, back and side view



3.2. RS232 and IrDA connection



4. Software organization

The ScanPal 2 software system consists of three modules:

- The *Kernel module*
- The *System (Operating System) module*
- The *Program module*

4.1. Kernel Module

The *Kernel module* forms the heart of the system. It is extremely secure and always protected by the system. Only a failure of the flash memory or incorrect switching off of the power supply, during system restart after a kernel update, can destroy the kernel. The *Kernel module* guarantees that the user can always download his program, even when the operating system has been damaged by the user program.

The *Kernel module* allows the following operations to be performed:

- ***Program Download***
- ***Update Kernel***
- ***Test & Calibrate***
- ***Version***

For further information, refer to section 5.4.

4.2. System Module

The *System module* is the operating system. It allows the following operations to be performed:

- ***Memory***
- ***Settings***
- ***Reader***
- ***Battery***
- ***Test***
- ***Download***
- ***Version***

For further information, refer to section 5.3.

4.3. Program Module

The *Program module* operates on top of the System module. The user programs are downloaded into this module.

The user program, downloaded into the *Program module*, is started automatically when the ScanPal 2 is powered up.

The user program pre-loaded into the *Program module* of the ScanPal 2 is the *application interpreter*, making it possible to run an application created with the *application generator*. By default, the application loaded is an inventory application allowing the following operations to be performed:

- ***Collect data***
- ***Upload data***
- ***Utilities***

For further information, refer to section 5.2.

4.4. Creating your own program

There are three development tools making it possible to create your own application or program.

- ***The application generator***

  Requires prior loading, into the *Program module*, of the *application interpreter* making it possible to run an application created with the *application generator*.

  For further details, see the *application generator* user manual.

- ***The "BASIC" compiler***

  Requires prior loading, into the *Program module*, of the *"BASIC" interpreter* making it possible to run a *"BASIC"* program.

- ***The "C" compiler***

For further information on the development tools, contact one of the Metrologic offices:

Metrologic Instruments, Inc – Corporate Headquarters
Tel: 856-228-8100 Fax: 856-228-6673
Email: info@metrologic.com

Metrologic Instruments GmbH – European, Middle East, & African Headquarters
Tel: +49(0) 89 890 190 Fax: +49(0) 89 890 19 200
Email: info@europe.metrologic.com

Metrologic do Brasil Ltda. – Brazil only
Tel: 5511-5505-2396 Fax: 5511-5507-2301
Email: info@br.metrologic.com

Metrologic South America – Outside Brazil
Tel: 5511-5505-6568 Fax: 5511-5505-1681
Email: info@sa.metrologic.com

Metro (Suzhou) Technologies Co., Ltd. – China
Tel: 86-512-2572511 Fax: 86-512-2571517
Email: info@cn.metrologic.com

Metrologic Asia (PTE) Ltd. – Singapore
Tel: 65-842-7155 Fax: 65-842-7166
Email: info@sg.metrologic.com

Metrologic Japan Co., Ltd. – Japan
Tel: 81-03-3839-8511 Fax: 81-03-3839-8519
Email: info@jp.metrologic.com

5. Operations

Before any operation, it is advisable to make sure that the replaceable batteries are new, or that the rechargeable battery is correctly charged.

5.1. Operations at the keypad

The ScanPal 2 keypad consists of 20 rubber keys and one key for triggering the scanner. The functions of the special keys are as follows:

Enter

Confirms an entry on the keypad.

Back Space

Deletes the characters situated to the left of the cursor.

Space

Inserts the *space* character.

Up

Moves the cursor upwards.

Down

Moves the cursor downwards.

Alphabetic / Numeric toggle

Makes it possible to change alternately from the alphabetic entry mode to the numeric entry mode.

When the terminal is in alphabetic mode, a small icon is displayed on the screen, and each numeric key can be used to insert one of the three letters written on the key. Successive pressing of the key successively displays the three available letters. Releasing the key for one second or pressing another key confirms the letter displayed and inserts it.

FN ***Function***

This key cannot be used on its own, but in combination with a numeric key (1 to 9), in order to obtain a specific function, depending on the program loaded.

For example, pressing simultaneously on the FN and 1 STU keys activates the function #1 (up to 9 functions).

Pressing simultaneously on the FN and ↑ , or FN and ↓ , keys makes it possible to adjust the screen contrast.

Pressing simultaneously on the FN and ◄┘ keys makes it possible to activate or de-activate the screen backlighting.

ESC ***Escape***

Generally makes it possible to exit the current operation.

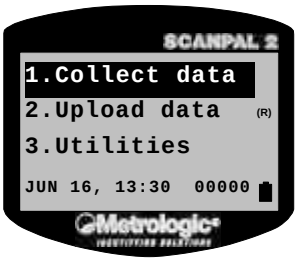
⏻ ***Power On/Off***

To avoid pressing this key in error, the power on/off function is activated only when the ⏻ key is held in for around 1.5 seconds.

5.2. Program Mode

This is the default operating mode when the ScanPal 2 is powered up. It depends on the user program loaded into the *Program module*.

The *application interpreter* and its inventory application, loaded by default, displays the following main menu:



The counter, located in the bottom right-hand corner of the screen, displays the number of records collected.

1. Collect data

Data collection starts after confirmation of the *Collect data* operation, using the ↵, key.

A new screen displays the following two prompts:

Item:

Qty: 1

The *Item (Article)* prompt expects an item code, read by the scanner or entered on the keypad and confirmed by the ↵ key.

The *Qty* (*Quantity*) prompt offers, by default, a quantity of 1, which can be modified by entering on the keypad the new quantity desired. This is confirmed using the ↵ key. The data collected are then recorded and the two prompts are displayed again.

Pressing the ESC key allows a return to the main menu.

2. ***Upload data***

   Uploads the data collected, via the selected upload port.

   The letter displayed on the screen, at the right of the *Upload Data* line, indicates the selected upload port: RS232 (R) , IR (T), IrDA (I) or Wedge (K).

   On the PC (under Windows), to receive the data and create a text file, use the *application generator*, *232_Read.EXE* or *IR_Read.EXE*.

   For further information, refer to the *application generator* user manual.

3. ***Utilities***

   - ***System settings***

     - ***Set Upload Port***

       Defines the data upload port: RS232 (cable or download cradle), IR (high-speed infrared transceiver), standard IrDA infrared or screen/keyboard Wedge.

       The letter displayed on the screen, at the right of the *Set Upload Port* line, indicates the selected upload port: RS232 (R), IR (T), IrDA (I) or Wedge (K).

       Default value: RS232.

     - ***Set Download Port***

       Defines the port for downloading an application or a file: RS232 (cable or download cradle), IR (high-speed infrared transceiver) or standard IrDA infrared.

       The letter displayed on the screen, at the right of the *Set Download Port* line, indicates the selected download port: RS232 (R), IR (T) or IrDA (I).

       Default value: RS232.

     - ***Transmission Speed***

       Defines the transmission speed, up to 115,200 bps.

       Default value: 115,200 bps.

     - ***LCD Backlight***

       Defines the duration of the backlighting.

       Default value: 20 seconds.

- ***Data Deletion***

  Defines whether, after an upload, the data is deleted *Manually*, with a request for confirmation, or *Automatically*, with no request for confirmation.

  Default value: Manually.

- ***Record Prompting***

  Activates (*Yes*) or de-activates (*No*) the display of the record number, after confirmation of an entry.

  Default value: Yes.

- ***View Settings***

  Displays the various settings.

- ***Browse Data***

  Displays the data collected. The and keys allow scrolling, in a loop, of all the data collected.

- ***Delete Data***

  Deletes the last record or all the records collected.

- ***Reading Test***

  Tests the read performance of the scanner and displays the bar code read, its length and its type (symbology).

  The symbologies enabled by default are as follows:

  Code 39

  Industrial 2/5

  Interleaved 2/5

  Codabar

  Code 93

  Code 128

  UPCE without Addon

  EAN8

  EAN13/UPCA without Addon

  The other symbologies can be enabled by the *application generator*.

- ***Set Date & Time***

  Defines the date and time.

- ***Download Program***

  Downloads an application (**.ATX*) created with the *application generator* into the *ScanPal 2 Portable Terminal*, via the selected download port.

  The letter displayed on the screen, at the right of the *Download Program* line, indicates the selected download port: RS232 (R), IR (T) or IrDA (I).

  On the PC (under Windows), use the *application generator* or *ATX_Load.EXE*.

  For further information, refer to the *application generator* user manual.

- ***Memory & Battery***

  Displays the size of the data memory (SRAM) in kilobytes, the voltage of the replaceable batteries or the rechargeable battery, and the voltage of the backup battery.

- ***Download Lookup***

  Downloads a *Lookup File* containing, for example, an item database, into the ScanPal 2, via the selected download port.

  On the PC (under Windows), use the *application generator* or *DLookup.EXE*.

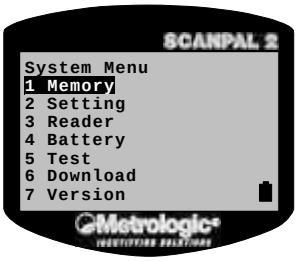
  Note: this function is not available if the application loaded does not use a lookup file.

  For further information, refer to the *application generator* user manual.

5.3. System Mode

Turn off the ScanPal 2, and then simultaneously press the 7 ABC , 9 GHI and ⏻ keys to enter *System mode*.

System mode offers the following operations:



1. Memory

- ***Size Information***

  Displays the size of the data memory (SRAM) and the size of the program memory (Flash ROM), in kilobytes.

- ***Initialize***

  Initializes the data memory (SRAM).

  Note: after an initialization, the data contained in the memory is deleted.

- ***Test***

  Tests the data memory. For a static random access memory (SRAM) size of 256 KB, the test takes around 15 seconds.

  Note: after a test, the data contained in the memory is deleted.

2. Settings

- ***Clock***

  Defines the date and time.

- ***Backlit***

  Defines the duration of the backlighting.

  Default value: 20 seconds.

- ***Speed***

  Defines the CPU operating speed. Five speeds are available:

Speed	***Consumption***
Full	*39 mA*
1/2	*22 mA*
1/4	*12 mA*
1/8	*7 mA*
1/16	*5 mA*

  The consumptions are given for normal operation, with no scanner reading or data transmission.

  If the full-speed mode is not necessary, choose the lowest speed, in order to save the batteries.

  Default value: Full speed.

- ***Auto Off***

  Defines the time beyond which power down is automatic, when no operation has been performed during this time period. If this value is equal to zero, the function is de-activated.

  Default value: 10 minutes.

- ***Power On***

  Two possible selections:

  Program Resume, which starts the program from the last session used before power down; or *Program Restart*, which restarts the program from the beginning.

  Default value: Program Resume.

- ***Key Click***

  Enables or *Disables* the issuing of a sound when a key is pressed.

  Default value: Enable.

3. Reader

Tests the scanner read performance and displays the bar code read, its length, and a letter identifying the code type (symbology).

The symbologies enabled by default are as follows:

Symbology	*Identifier*
Code 39	*A*
Industrial 2/5	*D*
Interleaved 2/5	*E*
Codabar	*G*
Code 93	*H*
Code 128	*I*
UPCE without Addon	*J*
EAN8	*M*
EAN13/UPCA without Addon	*P*

The other symbologies must be enabled by programming.

4. Battery

- ***Main***

  Displays the voltage of the replaceable batteries or the rechargeable battery.

  An icon, representing the battery, is permanently displayed on the screen, thus making it possible to view the charge state. When the battery icon is completely empty, the batteries should be replaced or the rechargeable battery recharged.

- ***Backup***

  Displays the voltage of the backup battery.

5. Test

- ***Buzzer***

  Tests the buzzer by means of the emission of different frequencies and durations.

  Press the key to start or stop the test.

- ***LCD & LED***

  Tests the LCD screen and the dual-colour LED.

  Press the key to start or stop the test.

- ***KBD***

  Tests the keypad keys.

  Pressing a key displays its value on the screen. The FN function key must be used in combination with a numeric key (1 to 9).

  Press the ESC key to stop the test.

6. Download

- ***RS232***

  Downloads a user program (**.SHX*) into the ScanPal 2, via the RS232 port (cable or download cradle).

  On the PC (under Windows), use *DownLoad.EXE*. The speed can go up to 115,200 bps.

- ***IR*** *(High-speed infrared)*

  Downloads a user program (**.SHX*) into the ScanPal 2, via the high-speed infrared transceiver.

  On the PC (under Windows), use *IRLoad.EXE*. The speed can go up to 115,200 bps.

- ***IrDA***

  Downloads a user program (**.SHX*) into the ScanPal 2, via the standard IrDA infrared.

  On the PC (under Windows), use *DownLoad.EXE*. The speed can go up to 115,200 bps.

7. Version

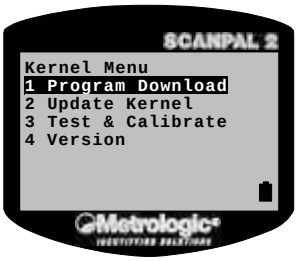
Displays the following information:

Hardware version number.....(H/W)
Serial number..... (S/N)
Manufacturing date.....(M/D)
Kernel version number .....(KNL)
Library version number.....(LIB)
User program..... (USR)

5.4. Kernel Mode

Turn off the ScanPal 2, and then simultaneously press the 7 ABC , 9 GHI and ⏻ keys to enter *System mode*; next turn off the ScanPal 2, and then simultaneously press the 1 STU, 7 ABC and ⏻ keys to enter *Kernel mode*.

Kernel mode offers the following operations:



1. Program Download

Downloads a user program (**.SHX*) into the ScanPal 2.

The download procedure is identical to that described in *System mode* (refer to section 5.3, *Download*).

2. Update Kernel

Updates the system kernel. Updating the kernel is sometimes necessary in order to improve the system performance, or for some other reason. This function guarantees that the latest version of the kernel is being used. The procedure for updating the kernel (*KSP2-xxx.SHX*) is identical to that for downloading a user program.

Be careful: after updating the kernel, wait until the system has completely restarted before powering down the ScanPal 2.

3. Test & Calibrate

This function is intended solely for performing various tests, diagnostics and calibrations in the factory. Do not use.

4. Version

Displays the following information:

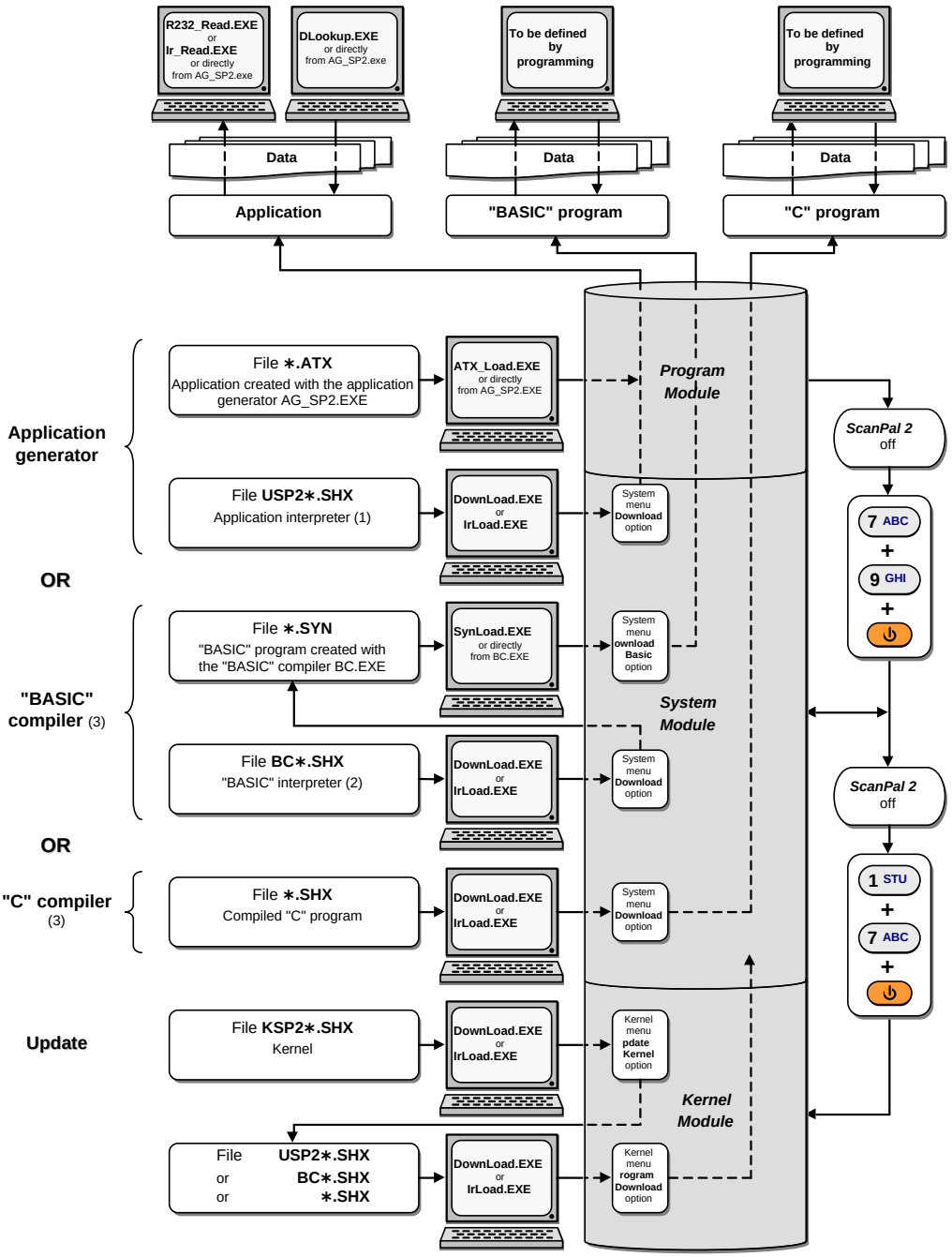
Hardware version number.....(H/W)

Serial number..... (S/N)

Manufacturing date.....(M/D)

Kernel version number .....(KNL)

5.5. *Overview*


R232_Read.EXE or lr_Read.EXE or directly from AG_SP2.exe
DLookup.EXE or directly from AG_SP2.exe
To be defined by programming
To be defined by programming
Data
Data
Data
Application
"BASIC" program
"C" program
Application generator
File ∗.ATX
Application created with the application generator AG_SP2.EXE
ATX_Load.EXE or directly from AG_SP2.EXE
Program Module
File USP2∗.SHX
Application interpreter (1)
DownLoad.EXE or lrLoad.EXE
System menu Download option
OR
"BASIC" compiler (3)
File ∗.SYN
"BASIC" program created with the "BASIC" compiler BC.EXE
SynLoad.EXE or directly from BC.EXE
System menu ownload Basic option
System Module
File BC∗.SHX
"BASIC" interpreter (2)
DownLoad.EXE or lrLoad.EXE
System menu Download option
OR
"C" compiler (3)
File ∗.SHX
Compiled "C" program
DownLoad.EXE or lrLoad.EXE
System menu Download option
Update
File KSP2∗.SHX
Kernel
DownLoad.EXE or lrLoad.EXE
Kernel menu pdate Kernel option
Kernel Module
File USP2∗.SHX
or BC∗.SHX
or ∗.SHX
DownLoad.EXE or lrLoad.EXE
Kernel menu rogram Download option
ScanPal 2 off
7 ABC + 9 GHI +
ScanPal 2 off
1 STU + 7 ABC +

6. Troubleshooting guide

- ***The ScanPal 2 doesn't come on after the ⏻ key has been pressed.***

  Change the batteries or recharge the battery.

- ***The ScanPal 2 doesn't come on after the batteries have been changed or the battery recharged.***

  Check that the replaceable batteries are correctly installed in their compartment and that the compartment (or the rechargeable battery) is properly engaged in the terminal.

  If the problem persists, contact Technical Support.

- ***The battery icon, indicating the charge state, is empty.***

  Change the replaceable batteries or recharge the battery.

- ***No transmission between the ScanPal 2 and the host system (PC or other), via the RS232 port (cable or download cradle).***

  Check that the RS232 cable is correctly connected to the host system and to the ScanPal 2 or to the download cradle.

  For transmission using the download cradle, check that the ScanPal 2 is correctly inserted in its cradle.

  Check that the communication settings of the host system match those of the ScanPal 2.

- ***No transmission between the ScanPal 2 and the host system (PC or other), via the high-speed IR transceiver.***

  Check that the IR transceiver is correctly connected.

  Check that the communication settings of the host system match those of the ScanPal 2.

  Check that the ScanPal 2 is correctly positioned in the IR transceiver read area (a distance of 5 cm to 100 cm, 2" to 39", and a maximum angle of 30°).

- ***The keypad doesn't work correctly.***

  Turn off the ScanPal 2, and then simultaneously press the 7 ABC , 9 GHI and ⏻ keys to enter *System mode*. Select the *Test KBD* option and carry out the keypad key test.

  If the problem persists, contact Technical Support.

The scanner doesn't work.

Check that the symbologies of the codes read are enabled.

Check whether the battery icon, indicating the charge state, is empty. If this is the case, change the replaceable batteries or recharge the battery.

If the problem persists, contact Technical Support.

7. Metrologic references and descriptions

Part Number	Description
SCANPAL2CB	Basic ScanPal 2 CCD kit, including: - 1 ScanPal 2 CCD portable terminal - CD includes: - 2 AAA batteries Application Generator - 1 RS232 cable User Manual
SCANPAL2CE-US	Advanced ScanPal 2 CCD kit, including: - 1 ScanPal 2 CCD portable terminal - CD includes: - 1 download/charger cradle and US power supply Application Generator - 1 RS232 cable User Manual - 1 rechargeable battery
SCANPAL2CE-EC	Advanced ScanPal 2 CCD kit, including: - 1 ScanPal 2 CCD portable terminal - CD includes: - 1 download/charger cradle and Euro power supply Application Generator - 1 RS232 cable User Manual - 1 rechargeable battery
46-46539	Dual Battery Charger, 1 NiMH battery and Euro Power Supply
46-46540	Ni-MH rechargeable battery pack
46-46541	Keyboard Wedge cable
46-46542	Protective Cover (imitation leather)
46-46543	IR Transceiver with Euro Power Supply
46-46544	"BASIC" compiler and license
46-46545	"C" compiler and license
46-46546	Charger Cradle with Euro Power Supply
46-46547	Download Cradle/Battery Charger, 1 NiMH battery and US Power Supply
46-46548	IR Transceiver with US Power Supply
46-46549	Charger Cradle with US Power Supply
46-46550	RS232 Cable